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Zou Qingsong, PhD
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Education

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- Ph.D., Computer Engineering, Nanyang Technological University (NTU), Singapore, 2003
- M.E., Computer Science and Engineering, Huazhong University of Science and Technology (HUST), P.R.C., 1997
- B.S., Physics, Central China Normal University (CCNU), P.R.C., 1994

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Research Interests

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Generally, I am interested in 2D Image processing, 3D volume visualization and network communication. Specifically, I am interested in how to use imaging processing, visualization and information techniques in medical applications and other related areas. My Ph.D. research explorers an object approach for fast volume visualization of medical imaging to aid surgical planning and surgical procedure. My master's research is related to image processing and imaging database. My current industrial experience is related to network communication and information processing. Thus, issues of image processing, visualization, image retrieving, network communication, medical image processing, and medical information system directly relate to my research.

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Research Experience

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Project Manager, Leader Developer, Agenix Technologies, Singapore, 2002 (part time)

- Robotics Skull Based Surgical Planning System with Real-Time 3D Volume Visualization

o Manage team of 4 through development, unit testing, and system integration testing.
o Utilizing such technologies as 2D image processing, 3D volume visualization, network communication (DICom3, TCP/IP, FTP), VolumePro, OpenGL, DICom3 and VTK (VC++ MFC).

Research Associate, Nanyang Technological University, Singapore, 1998-2001
- Object-Based Volume Visualization for Medical Imaging (Ph.D. Thesis)
o Proposed a formal volume visualisation model, a segment tree structure, an object-based volume visualisation technique and a fast volume visualisation technique for medical applications
o Proposed a client/server mode volume visualization pipeline that separates the 2D and 3D computer graphics computation to speed up the visualisation procedure

- Augmented Reality for Therapy (ART)
o Designed the configuration system, object modeling system, 3D visualization system and the display system with the collaboration of urology and orthopedic surgeons
o A complex surgical procedure can be navigated visually with great precision by overlaying on an image of the patient a computer generated graphical image specifying the locations of incisions, areas to be avoided, the diseased tissue and so on.

- A Web Based Client/Server Mode 3D Volume Visualization System
o This system was based on the client/server mode visualisation pipeline that provides a collaborative environment for medical applications.
o More than one client can use a normal PC to connect to the remote rendering server to perform the interactive surgical planning separately or cooperatively.

- A Standalone Volume Visualization System
o This system has an integrated internal Dicom3 server, POP3 server and HTTP Server. It can load a volume dataset from a local file system, a

remote Dicom3 compliant server or a live video stream from a motion camera.
o Surgeons can use this system to exchange the volume dataset, diagnostic report through the Dicom3 network to perform the collaborative analysis and surgical planning.

Research Assistant, Huazhong University of Science and Technology, P.R.C, 1994-1997
- Parallel Graphics Database Query System Based on Dawning-1000A MPP Computer System (AIX) -National 863 High-Tech Key Project (M.E. Dissertation)
o Designed the application model, communication model and transaction management model
Proposed an anti-data-skew parallel join algorithm in one of my papers, which was adopted in our project

- Electric Power Paper Query and Management System under Network Environment- National 85 High-Tech Key Project
o Proposed the technique to divide the content of an electric power paper into three layers including graphics group, graphics segment and graphics element using an OOP idea. In the meantime, some new ideas of the object-oriented database such as object view and a hierarchical management model were presented in published papers and implemented in this project.

Parallel Graphics Database System under Network Environment, HUST
Designed the graphics database and the parallel transaction management model

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Teaching Experience
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- Teaching Assistant, Nanyang Technological University, Singapore, 1998-2000
o Supervised 2 Undergraduates on the Final Year Project

o Tutor of "C Language Programming" Lab Session

- Teaching Assistant, Huazhong University of Science and Technology, 1995
o Supervised 4 Undergraduates on the Final Year Project
o Tutor of "Data Structure", "Computer Network" and "Computer Algorithm Designing"

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Business Experience
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2001-present, Current Employer, Singapore
- Senior Software Engineer, Technical Leader, B2B BusinessWare suit
o Contributed to development effort and served as main technical resource for developers
o Delivered BusinessWare for extended enterprise management to end-users with positive results

- Project Leader, P2P Web Service BusinessWare suit
o Oversaw requirements-gathering and proposal, which won the follow-on work for company.
o Oversaw quality assurance of all custom applications and custom interfaces.
o Organized and managed rollout of system to initial deployment location.

Project Manager, Tong Li Co. Ltd, P.R.C, 1997-1998
- An Electronic Map Based GPS Car Tracing System
o Managed projects from conception through development planning, budgeting and scheduling; supervised system development, deployment.

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Honors and Awards
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- Outstanding Contributions Award, RosettaNet Consortium

- Research Scholarship, NTU
- Teaching Assistantship, NTU
- Outstanding Graduated Student Fellowship, HUST
- Science and Technology Three Class Reward of National Electric Power Bureau, HUST

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Publications

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- "An Object Oriented Graphics Database" (in Chinese), Journal of Huazhong University of Science & Technology, Vol. 12, 1997
- "Convex Object Based Volume Visualization-A Formal Proof and Example", Computers & Graphics, Vol. 25, 2001

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Conference Papers

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- "Designing and Implementation of Distributed Graphics Database System Based on Object Model" (in Chinese), Hubei Province Computer Association Yearly Conference, 1996
- "A Collaborative 3D Volume Visualization Pipeline", Proceedings of IEEE-EMBS Asia-Pacific Conference on Biomedical Engineering, Sep., 2000, Hangzhou, China, Page(s): 85-86, 26-28
- "Real time three-dimensional volume visualization using segment tree and VolumePro", Magnetic Resonance Materials in Physics, Biology and Medicine, Vol. 12, 2001, XII International Workshop on MRA, Lyon, France, October 4-7, 2000, Page(s): 45-46
- "An Internet Based Collaborative Surgical Planning System", Proceedings of 4th annual NTU-SGH Biomedical Engineering Symposium, 26 April, 2001, SGH, Singapore.
- "Interactive Surgical Planning Using Context Based Volume Visualization Techniques", Proceedings of International Workshop on Medical Imaging and Augmented Reality, June, 2001, Shatin, N.T., Hong Kong, Page(s): 21-25, 10-12
- "Surgical Planning System with Real-Time Volume Rendering",

Proceedings of International Workshop on Medical Imaging and Augmented Reality, June 2001, Shatin, N.T., Hong Kong, Page(s): 259-261, 10-12
- "A Web Based Collaborative Volume Visualization System", Proceedings of 15th European Simulation Multiconference, June 7-9, 2001, Prague, Czech Republic, Page(s): 988-994
- "MRI Head Segmentation for Object-based Volume Visualization", ANZIIS 2001, The Seventh Australian and New Zealand Intelligent Information Systems Conference, Nov. 18-21, 2001, Australia, Page(s): 361 -366

Argonne National Laboratory

Dear Professor,

I am writing to apply for the postdoctoral research fellowship in the Mathematics and Computer Science Division announced on the website. I was conferred the Ph.D. in computer engineering from Nanyang Technological University in 2003. Currently, I am working in a software company as a senior software engineer and project leader. I believe that my research background combined with my industrial experience make me a strong candidate for the position outlined in your notice.

My Ph.D. thesis, directed by Dr. Kwoh, is entitled "Object-Based Visualization for Medical Imaging." Start from the definition of a formal volume visualisation model, I proposed an object-based visualisation technique with an aim to overcome difficulties associated with the volume rendering and surface-based rendering techniques to meet requirements of medical applications. A fast volume visualisation technique based on a segment tree structure was presented, which can perform the fast re-visualisation to re-generate the result of visualisation. I have implemented several systems based on these techniques such as an integrated visualization system and a client/server mode pipeline, which can separate the 2D and 3D computer graphics computation to speed up the visualisation procedure and provide a collaborative environment for medical applications. I have also published several papers and introduced our researches on some

international conferences. After I submitted my Ph.D. thesis, I have done a part time research work as a project manager and leader developer for the project entitled "Robotics Skull Based Surgical Planning System with Real-Time 3D Volume Visualization." In this project, we developed a surgical planning system for surgeons utilizing technologies such as 2D image processing, 3D volume visualization (VolumePro, VTK) and network communication (DiCom3). I managed a research team of 4 through development, unit testing, and system integration testing. Depending on techniques and research experience of my Ph.D. research, we completed this project quickly.

My research interests range widely, from imaging processing, volume visualization to computer graphics, graphics database and network communication. During my master's research, I have been involved in some high-tech key projects such as, "Electric Power Paper Query and Management System under Network Environment" in which I divided the content of an electric power paper into three layers and proposed some new ideas of the object-oriented database techniques such as object view and a hierarchical management model. I have also been involved in the project "Parallel Graphics Database under Network Environment" to design the graphics database and the parallel transaction management model. My master's dissertation was entitled "Parallel Image Database Based on Dawning- 1000A MPP Computer System." In this project, I designed and implemented the communication mechanism based on message passing mechanism under UNIX system. I have also proposed an anti-data skew parallel join algorithm.

My research interest in network communication has grown out of these projects in my Ph.D. research and master's research. I realize that network communication and collaborative processing can play an active role in image processing and visualization especially 3D volume data processing for interactive applications. In the meantime, OOP is one of the frontiers and can contribute a lot to the representation and storage model of 3D volume data. Thus, after I submitted my Ph.D. thesis in 2001, I decided to join my current company with a focus on network

collaboration and information processing. The aim of my current company is to provide BusinessWare for extended enterprise management built on the innovative P2P and web services architecture. It allows for back-to-back integration across different trading partners in the supply chain. I have accumulated a lot of hand on project management, system design, development experiences from these experiences and very good knowledge of state-of-art technologies such as the information exchanging, communication technique and industrial standards. I will cherish these experiences forever which give a broad range of knowledge that are impossible from my academic study and the capabilities to analyze problems from different angles.

As my curriculum vitae shows, aside from research work, I have had many teaching opportunities during my graduate studies, including tutoring courses of programming language, algorithm designing, computer network. I have also supervised lab sessions and some undergraduates on their final year projects related to imaging processing and computer visualization.

To give you a better sense of my qualifications I have included my curriculum vitae and would be happy to send you additional materials. Thank you very much for your consideration and look forward to hearing from you.